

REMARKS

Applicant acknowledges receipt of the Office Action dated August 16, 2007, in which Claims 1-52 are rejected based on 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,962,947 by Wright et al (hereinafter '*Wright*') in view of U.S. Patent No. 5,283,216 by Mitchell et al. (hereinafter '*Mitchell*').

I. Status of the Claims

Claims 1-38 & 40-53 are currently pending.

Claims 1-38 & 40-52 remain as originally filed.

Claim 53 is new.

Claim 39 is canceled without prejudice to make room for the new claim 53. The cancellation of this claim is not for patentability reason, and Applicant reserves the right to re-enter this canceled claim later as a new claim.

II. Amendments to the Specification

Paragraph [0035] of the specification as filed has been amended to correct an obvious grammatical error. No new matter was added by way of these amendments.

III. Rejections 35 U.S.C. § 103(a) over *Wright* in view of *Mitchell*

Claims 1-52 were rejected under § 103(a) over the combination of *Wright* with *Mitchell*.

Applicant respectfully traverses the Examiner's rejection, and respectfully disagrees that the combination of these two references renders these claims unpatentable. The withdrawal of the §103 rejection on such claims is respectfully requested for the reasons laid out below.

III.1 Factual findings:

Applicant determines the following factual findings from the two cited references:

1) *Wright* discloses a regeneration method for a Fischer-Tropsch catalyst. *Wright* states that catalyst systems can become deactivated by a number of processes, including coking, sintering, metal oxidation, sulfur poisoning, and surface condensation of heavy hydrocarbons (see *Wright* Col. 2 lines 51-56; Col. 4 lines 5-18). Particularly, *Wright* addresses the deactivation of the catalyst by hydrocarbon deposits (see *Wright* Col. 4 lines 14-28).

2) To regenerate such deactivated catalyst, *Wright* discloses the use of a regeneration pressure lower than the Fischer-Tropsch reaction pressure (*Wright* Abstract; Col. 1 lines 33-39; Col. 4 lines 57-59; Col. 9 lines 7 & 14-17) to remove heavy hydrocarbon deposits by effecting volatilization (*Wright* Col. 8 lines 38-46; Col. 10 lines 42-43). *Wright* further discloses a cycle between reaction and regeneration which comprises a pressure swing from a reaction pressure to a lower regeneration pressure and back to reaction pressure (*Wright* Col. 10 lines 1-4).

3) The regeneration in *Wright* is optionally carried out at a regeneration temperature higher than the Fischer-Tropsch reaction temperature (*Wright* Col. 9 lines 7-8;).

4) The regeneration in *Wright* is carried out by contacting the deactivated catalyst with a regeneration gas, which can contain oxygen and/or steam (*Wright* Col. 8 lines 66-67). Indeed, *Wright* unexpectedly found that, contrary to common belief that steam deactivates metal-containing catalysts, steam could be an effective regeneration gas component under certain regeneration conditions (*Wright* Col. 9 lines 27-44; Examples 1-3).

5) The regeneration gas in *Wright* can also contain hydrogen (*Wright* Col. 8 line 66). In preferred embodiment, the regeneration gas in *Wright* contains hydrogen and steam (*Wright* Col. 9 lines 2-5; Col. 10 lines 32-33). In such case, the hydrogen content in the regeneration gas may not exceed 5% by volume (*Wright* Col. 9 lines 3-5). Examples 1-3 illustrate regeneration procedures using 5-7 vol% hydrogen in steam (*Wright* Col. 11 lines 66-67; Col. 12 lines 57-59; Col. 13 lines 55-56).

6) The regeneration in *Wright* may be carried out in a catalyst slurry which includes solid catalyst in a liquid suspension (*Wright* Col. 10 lines 21-25). Used slurry containing used catalyst may be passed from a slurry phase reactor to a variable-pressure regenerator, where the slurry is exposed to regeneration conditions and returned back to reactor (*Wright* Col. 10 lines 26-46).

7) *Mitchell* was used as a secondary reference by the Examiner for the teaching of rejuvenation in the presence of liquid hydrocarbons. *Mitchell* particularly discloses a rejuvenation method for a Fischer-Tropsch catalyst which is partially deactivated in slurry phase hydrocarbon synthesis. The rejuvenation comprises contacting the partially deactivated catalyst with hydrogen in the presence of liquid hydrocarbons (*Mitchell* Col. 1 lines 50-56).

- 8) The hydrogen used in the rejuvenation process of *Mitchell* should however be free of oxygen (*Mitchell* Col. 2 lines 5-6; Col. 3 lines 29-30), but also be free of moisture, i.e., less than about 0.5 wt% of water in the hydrogen (*Mitchell* Col. 3 lines 26-29).
- 9) The rejuvenation in *Mitchell* is carried out at reaction pressures (*Mitchell* Col. 1 lines 65-66; Col. 4 line 59).
- 10) The rejuvenation in *Mitchell* is carried out at temperatures in the range of reaction to 100°F below reaction temperature (*Mitchell* Col. 1 lines 66-67; Col. 4 lines 60-61).
- 11) Neither of the cited references teaches the mixing of a reduced catalyst with a hydrocarbon liquid *which is substantially free of oxygen* to form a slurry.
- 12) Neither of the cited references teaches the following sequence of steps: contacting of a catalyst with a reducing gas to the catalyst subsequently followed by mixing the resulting reduced catalyst with a hydrocarbon liquid which is substantially free of oxygen to form a slurry, which is then subsequently contacted with syngas.
- 13) Additionally, neither of the cited references discloses contacting a hydrocarbon liquid with a stripping gas to generate a stripped hydrocarbon liquid which is substantially free of dissolved oxygen before the stripped hydrocarbon liquid is mixed with the reduced catalyst.

III.2 Basis of the 103 rejection:

The Examiner has acknowledged that some claim features (see *factual findings No. 11 & 12*) are missing in these references (*Office Action* Page 4 Section 8 last sentence). It should be noted that one of the steps in the present claimed invention was misrepresented by the Examiner in this section. It was incorrectly stated that “a hydrocarbon liquid slurry is added to the reduced catalyst”. Rather it should be corrected that this particular step in the claimed invention is mixing a hydrocarbon liquid (not slurry) with the reduced catalyst *to form the slurry*. The Examiner further states that, even though these references are silent with respect to these features (*factual findings No. 11 & 12*), it would be *prima facie* obvious for the artisan to start with their combined teachings and to couple such teachings with a stripping step (*Office Action* Section 9 bridging Page 4 and Page 5).

This conclusion from the Examiner is rationalized by merely stating that their combined teachings *implicitly* suggest to the artisan these additional features to alleviate possibilities of

oxidation that cause the deterioration of the catalyst activity. The Examiner further justifies such conclusion by stating that “alternative embodiments [of the regeneration methods disclosed by *Wright* and *Mitchell*] will be recognized by those skilled in the art and are intended to be included within the scope of [their] claims”. The Examiner contends that the artisan would be motivated to combine their teachings to alleviate further sources of oxidation. The Examiner reasons that the artisan, “as compelled by the norms of practice, would endeavor to develop a process to maintain or retrieve the activity of a catalyst used for hydrocarbon synthesis with a reasonable expectation of success” step (*Office Action*, Section 9 on Page 5, last sentence). As for stepwise additions and other limitations about different vessels, catalysts, and liquid hydrocarbons, the Examiner states that they are merely optimization steps with normal undertaking of the artisan and would require routine experimentation (*Office Action* Sections 10-11 on Page 5).

Additionally, the Examiner explains why the applicability of two references related to catalyst regeneration is justified when there is no mention of regeneration in the present claims. The justification is as follows: the broadest reasonable interpretation of the claimed method of making a catalyst for use in a hydrocarbon synthesis reactor was given to encompass the process of rejuvenating a catalyst for use in a hydrocarbon synthesis reactor in light of the disclosure of Applicant’s specification (*Office Action* Section 12 on Page 5).

III.3 Applicant’s Arguments:

Applicant respectfully traverses the rejection of these claims based on the combination of *Wright* with *Mitchell* for lack of *prima facie* obviousness. The combination of *Wright* with *Mitchell* does not provide explicitly or implicitly all of the elements (as required under **MPEP 2143.03**) of independent Claims 1 & 52 and *a fortiori* of all of the elements of the dependent claims rejected on the same basis. Moreover, the cited references are not combinable because they are incompatible in operation. Furthermore, the Examiner has not provided any facts and/or reasonable technical reasons to support the assertion that the combination of *Wright* with *Mitchell* provides or suggests the missing features and the order of the steps in the claimed invention.

Claim features not found in either reference

Applicant first argues that the combination of *Wright* with *Mitchell* cannot replicate the claimed invention due to claim features not found in either reference. As shown by *factual findings No. 1 & 7* listed above, both *Wright* and *Mitchell* references are directed to regeneration methods for hydrocarbon synthesis catalysts. But as shown by *factual findings No. 11-13* listed above, *Wright* and *Mitchell* in combination fail to provide all of the elements of the claimed invention.

Mitchell was used by the Examiner for his teaching of the reduction of a deactivated catalyst in the presence of liquid hydrocarbons. However, *Mitchell* still fails to provide the subsequent mixing of the reduced catalyst with a hydrocarbon liquid which is substantially free of oxygen. *Mitchell* also fails to provide the stripping step which generates the hydrocarbon liquid which is substantially free of oxygen. The Examiner has indeed acknowledged that these references are not sufficient to provide the claimed invention as a whole.

Applicant not only contends that *Mitchell* does not remedy to the deficiencies of *Wright*, but also submits that neither reference reasonably provides guidance to the artisan of where to find the necessary features to provide the modifications of *Wright*'s regeneration method as suggested by the Examiner in order to obtain the claimed invention.

No factual and technically-based reasons to supplement the references by 'norm of practice'

Applicant further argues that the Examiner has not provided any facts and/or reasonable technical reasons to support the assertion that the combination of *Wright* with *Mitchell* provides or suggests the missing features and the order of the steps in the claimed invention.

Because the Examiner is aware of the insufficiency of these references to provide the claimed invention as a whole, the Examiner uses the 'norms of practice' to supplement the missing features of their teachings. However, the Examiner has not provided any factual evidence that a stripping step was 'conventional' in the art of catalyst regeneration. The statement concerning the artisan's inducement to do so to avoid oxidation of catalyst to modify *Wright*'s method appears to be at least inconsistent within the context of *Wright* as a whole. How would an artisan be compelled to modify *Wright*'s method by using a stripping step to form an O₂-free hydrocarbon liquid or to mix a regenerated catalyst with an O₂-free hydrocarbon liquid, when *Wright* is clearly not afraid of using an oxidant (steam, O₂) during the catalyst regeneration (*factual finding No. 4*)?

Applicant further wonders why the artisan would be compelled to use an additional step (incurring extra cost) to avoid contact with an oxidant when *Wright* uses an oxidizing component during its regeneration? Applicant submits that the Examiner has not provided a sufficient technical basis of why the artisan would combine the disclosures of these references (when Applicant will argue later that they are incompatible in operation), and further why the artisan would supplement their teachings by adding a step that, Applicant now argues, is hardly a step commonly used during a catalyst regeneration.

Contrary to what is stated in the Office Action, there is no guidance to the artisan from these references to modify *Wright*'s teachings with those of *Mitchell*. Applicant could not find in the references themselves the factual support to the assertions in the *Office Action* that the artisan would be guided to the methods of *Wright* and *Mitchell* as a starting point and add a stripping step to arrive to the present claimed invention.

The cited references are not combinable because they are incompatible in operation.

As shown by *factual findings No. 1 & 7* listed above, both *Wright* and *Mitchell* are directed to regeneration methods for hydrocarbon synthesis catalysts. These references aim at restoring catalyst activity for the continual reuse of the catalyst in the hydrocarbon synthesis reactor, but these regeneration methods are carried out under different operating conditions. Indeed, these references address restoration of catalyst activity which is lost or partially lost based on different primary causes of deactivation which result in different mechanisms of deactivation and thus different mechanisms of reactivation; this ultimately led them to different regeneration operating solutions.

Wright teaches a method of regeneration which uses a lower pressure and optionally a higher temperature than used under reaction conditions to effect the vaporization of the hydrocarbons coating the deactivated catalyst (*factual findings No. 2 & 3*). On the other end, *Mitchell* teaches a method of regeneration which uses about the same pressure but a lower temperature than used under reaction conditions to effect the reduction of metal (*factual findings No. 9 & 10*). These are clearly opposite operating trends, which are antithetical and thus not combinable. *Wright* in fact develops a method for the reversal of a deactivation mechanism (carbon and hydrocarbon deposits) that *Mitchell* considers irreversible and not susceptible of recovery, even with hydrogen (*Mitchell* Col. 2 lines 39-43).

Applicant further contends that their disclosures are incompatible with respect to the composition of the regeneration gas. *Wright* uses a regeneration gas comprising, among others, hydrogen, steam and/or oxygen such as air (*factual findings No 4 & 5*), but *Wright* further specifies that in such case when hydrogen is present with steam in the regeneration gas, hydrogen is in small amount, i.e., less than 5 vol% or 5-7 % (*factual finding No. 5*). On the other end, *Mitchell* teaches hydrogen as *the* regeneration gas (thus in an amount much greater than 5-7 vol.%), and further requires that the hydrogen be free of water and oxygen (*factual finding No. 8*). The avoidance of oxidants such as oxygen and moisture (water, steam) during the hydrogen rejuvenation method of *Mitchell* makes sense in view of *Mitchell's* aim at *reversing the deactivation mechanism caused by oxidation*. As such, the presence and absence of oxidants in the regeneration gas used in the catalyst reactivation methods disclosed by these two references are not reconcilable. Thus, it is improbable that an artisan would combine the cited references because they are incompatible in operating conditions.

For at least the foregoing reasons, Applicant asserts that Claims 1-38 & 40-52, as originally filed, are patentable over the cited references, and respectfully requests the withdrawal of the 103 rejection of these claims for their immediate allowance.

IV. New claim 53.

Applicant added a new claim 53 dependent from independent claim 52 to add an embodiment to which Applicant is entitled. This new claim does not constitute new matter, as it is supported by the application as originally filed, for example by at least lines 7-11 of paragraph [0021] on page 10; lines 3-7 of paragraph [0035] on page 16 and lines 1-4 of paragraph [0042] on page 18 of the specification as originally filed.

Applicant asserts that Claim 53 is patentable over the cited references, since it depends from independent Claim 52 which is patentable over the cited art, and further because neither reference discloses a stripping step to provide a hydrocarbon liquid which is substantially free of oxygen prior to mixing it with a reduced catalyst.

Applicant respectfully requests its immediate allowance.

V. Conclusion

Applicant believes that this submission fully responds to the *Office Action* dated August 16, 2007. Applicant further believes that no new matter was added by way of amendments to the specification and addition of a new claim. No claims, as originally filed, were amended in this reply.

Claims 1-38 & 40-53 are patentable over the cited art and their allowance is respectfully solicited.

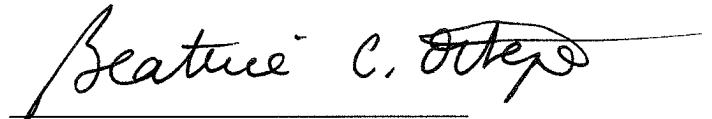
If the Examiner has any questions or comments or otherwise feels it would be advantageous to discuss any issues pertaining to this response by a conference, the Examiner is encouraged to telephone the undersigned at (281) 293-4751.

Applicant believes that this response is timely filed within the three-month shortened statutory deadline set forth in the *Office Action* of August 16, 2007, and that no fee is due. Applicant further believes that no additional claim fee is required as the result of the addition of a new claim (Claim 53) because Applicant canceled a claim (Claim 39) without prejudice, for *the total number of pending claims not to exceed the total number (52) of claims for which fees have previously been paid.*

If any required fee has been inadvertently omitted or any fee has been overpaid, or in the event that an extension of time is necessary in order for this submission to be considered timely filed, the Commissioner is authorized to please appropriately charge or credit those fees to **Deposit Account Number 16-1575** of ConocoPhillips Company, Houston, Texas, and consider this a petition for any necessary extension of time.

Respectfully submitted,

CONOCOPHILLIPS COMPANY - IP LEGAL



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